CLAIMS

We claim:

1. A polynucleotide which specifically binds to a target nucleic acid molecule and circularizes around said target, wherein said polynucleotide comprises:

a target binding sequence which is at least partially complementary and capable of binding to a sequence of the target; and

a catalytic domain which is capable of catalytic activity, wherein said catalytic activity is inhibited in the absence of binding of the polynucleotide to the target.

2. A polynucleotide according to claim 1, wherein said catalytic activity catalyzes said circularization of the polynucleotide around the target

3. A polynucleotide according to claim 2, wherein said catalytic activity is a ligase activity.

4. A polynucleotide according to claim 3, wherein said ligase activity comprises ligation of 5' and 3' ends of said polynucleotide to topologically link the polynucleotide to the target.

5. A polynucleotide according to claim 3, wherein said ligase activity comprises ligation of the 5' end of said polynucleotide to the 2' hydroxyl group of an internal nucleotide of said polynucleotide.

6. A polynucleotide according to claim 3, wherein said catalytic domain is the catalytic domain of a hairpin ribozyme.

7. A polynucleotide according to claim 1, wherein said catalytic domain comprises ribonucleotide residues or analogs thereof.

8. A polynucleotide according to claim 1, wherein said catalytic domain comprises deoxyribonucleotide residues or analogs thereof.

9. A polynucleotide according to claim 1, wherein said catalytic domain comprises both ribonucleotide and deoxyribonucleotide residues, or analogs thereof.

10. A polynucleotide according to claim 1, wherein the inhibition of said catalytic activity is effected by a regulatory nucleic acid sequence which binds to at least a portion of the target binding sequence, thereby preventing said circularization when the target binding sequence is not bound to the target.

11. A polynucleotide according to claim 1, wherein said target comprises RNA.

12. A polynucleotide according to claim 1, wherein said target comprises DNA.

13. A polynucleotide according to claim 1, wherein said polynucleotide is prepared synthetically.

14. A polynucleotide according to claim 1, wherein said polynucleotide is prepared by expression from an expression vector.

15. A polynucleotide according to claim 14, wherein said expression occurs *in vitro*.

16. A polynucleotide according to claim 14, wherein said expression occurs *in vivo*.

17. A polynculeotide according to claim 16, wherein said polynucleotide is expressed by RNA polymerase II or III in the nucleus of a host cell.

18. A complex comprising a polynucleotide according to claim 1 circularized around said target molecule.

19. A method for circularizing a polynucleotide around a target nucleic acid molecule, said method comprising contacting said target molecule with a polynucleotide according to claim 1, wherein binding of said target binding sequence to said target prevents inhibition of said catalytic activity, thereby allowing circularization to proceed..

20. A method for reducing efficiency of transcription, comprising topologically linking a polynucleotide to a target according to the method of claim 19, wherein said topological linkage reduces efficiency of transcription from the target.

21. A method for reducing efficiency of translation, comprising topologically linking a polynucleotide to a target according to the method of claim 19, wherein said topological linkage reduces efficiency of translation from the target.

22. A method for detecting presence or absence of a target nucleic acid molecule, said method comprising contacting a composition suspected of containing said target with a polynucleotide according to claim 1 and detecting circularization of the polynucleotide around the target, wherein presence of said circularization indicates presence of the target in the composition, if any.

23. A method according to claim 22, wherein said target is linked to a solid support.

24. A method according to claim 23, wherein said solid support is a hybridization membrane.

25. A method according to claim 22, wherein said polynucleotide is comprised within an array.

26. A method according to claim 22, wherein said detection comprises amplification of the circularized polynucleotide.

27. A method according to claim 26, where said amplification comprises rolling circle amplification.

28. A method according to claim 22, wherein said polynucleotide comprises a detectable label and said detection comprises detection of the label bound to the target.

29. A method according to claim 28, wherein said label is selected from the group consisting of radioactive, fluorescent, hapten, or enzymatic labels, or a member of a binding pair.

30. A library comprising a plurality of polynucleotides, wherein each of said polynucleotides comprises a target binding sequence, a catalytic domain which is capable of catalytic activity, and a regulatory sequence which inhibits catalytic activity in the absence of binding between the target binding sequence and a nucleic acid target, and wherein at least one of the target binding sequence, the catalytic domain, and the regulatory sequence is at least partially randomized.

31. A method for selection of polynucleotides that are capable of topologically linking to a target nucleic acid molecule, comprising contacting said target with a plurality of polynucleotides from a library according to claim 30, and amplifying the polynucleotides which become topologically linked to the target.

32. A kit comprising a polynucleotide according to claim 1.

33. A kit comprising a library according to claim 30.